UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/869,206	06/25/2001	Wolfgang Frizsche	F-7035	1203

7590 08/04/2003

Jordan and Hamburg
122 East 42nd Street
New York, NY 10168

EXAMINER	
CHAKRABARTI, ARUN K	

ART UNIT	PAPER NUMBER
1634	

DATE MAILED: 08/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)
09/869,206	Czaki
Examiner	**Art Unit**
Arun Chakrabarti	1634

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Jun 18, 2003* .

2a) ☐ This action is **FINAL.** 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-24* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ *Notice of References Cited* (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
4) ☐ *Interview Summary* (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: *Detailed Action*

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 18, 2003 has been entered.

Specification

2. Claims 1 has been amended.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to

the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103© and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-12, and 14-24 are rejected under 35 U.S.C. 103 (a) over Yamashita (U.S. Patent 5,646,420) (July 8, 1997) in view of Peeters (U.S. Patent 6,325,904 B1) (December 4, 2001) further in view of Oyama et al. (U.S. Patent 5,552,274) (September 3, 1996).

Yamashita teaches affinity sensor for detecting specific binding events, comprising a carrier substrate provided with at least two electrodes and having a predetermined area, the electrodes being equidistantly spaced apart from each other and engagingly bordering the area from both sides, at least the area being adapted for receiving immobilized specific binding partners, the specific binding partners being capable of coupling complementarily associated binding partners directly or via further specific binding molecules, the area having a minimum width adapted for capture of at least one complementarily associated being partner provided with one electrically conductive particle within the area in such a way as to allow for formation of a respective tunnel contact junction between the particle and the electrodes (Abstract, Figure 1, Claims 1 and 11, and Column 1, line 50 to column 3, line 37).

Yamashita teaches affinity sensor, wherein the width is under 800 nm.(Column 1, lines 16-20).

Yamashita teaches affinity sensor for detecting specific molecular binding events, wherein the immobilized specific binding partners cover the electrodes with a thickness which permits tunnel effects (Claims 1 and 11, and Column 1, line 50 to column 3, line 37).

Yamashita teaches affinity sensor for detecting specific molecular binding events, wherein the electrodes are each two micro-electrodes arranged in a pair, the electrodes being connected to an amplifier circuit with an associated measuring and evaluating unit so that an electric current flow across the area can be detected when there is a voltage applied across the electrode (Column 5, lines 1-12).

Yamashita inherently teaches affinity sensor for detecting specific molecular binding events, wherein the electrodes are part of the amplifier circuit and project from out of the latter (Column 5, lines 1-12).

Yamashita inherently teaches affinity sensor for detecting specific molecular binding events, wherein the specific binding partners enter into chemical coordination (Abstract and Column 4, lines 1-49).

Yamashita teaches affinity sensor for detecting specific molecular binding events, wherein the specific binding partners are bioactive or biomimetic protein molecules (Abstract, Figure 1, Claims 1 and 11, and Column 1, line 50 to column 3, line 37).

Yamashita teaches affinity sensor for detecting specific molecular binding events, wherein the conductive particles are of sizes in the nanometer to micrometer range. (Column 1, lines 16-20).

Yamashita teaches affinity sensor for detecting specific molecular binding events, wherein the conductive particles consist of metal-cluster compounds (Column 2, lines 17-29).

Yamashita do not teach a microchip.

Peeters teaches a microchip (Abstract and Figures 1-7).

Yamashita does not teach the other specific binding partner nucleic acids and saccharides.

Peeters teaches the other specific binding partner nucleic acids and other molecules (Column 3, lines 53-55 and column 4, lines 56-6).

Yamashita does not teach the affinity sensor, wherein a plurality of reference areas is provided being occupied with different inactive binding partner.

Peeters teaches the affinity sensor, wherein a plurality of reference areas is provided being occupied with different inactive binding partner (Figures 1-6).

It would have been *prima facie* obvious to one having ordinary skill in the art at the time the invention was made to combine and substitute the microchip and detection of other specific binding partner of Peeters into the affinity sensor of Yamashita, since Peeters states, "Thus, it is an object of the present invention to provide a novel and rapid method to analyze small biological molecules in solutions such as proteins and to sequence DNA by using semiconductor chip technology with extremely high packing densities (Column 3, lines 47-51)." By employing scientific reasoning, an ordinary artisan would have combined and substituted the microchip and detection of other specific binding partner of Peeters into the affinity sensor of Yamashita in order to improve the analysis of biological molecules. An ordinary practitioner would have been

motivated to combine and substitute the microchip and detection of other specific binding partner of Peeters into the affinity sensor of Yamashita in order to achieve the express advantages noted by Peeters, of an invention which provides a novel and rapid method to analyze small biological molecules in solutions such as proteins and to sequence DNA by using semiconductor chip technology with extremely high packing densities.

Moreover, Peeters teaches affinity sensor wherein the chip surface is formed by a silicon wafer or by a glass target and wherein the affinity areas are separated from each other at their intersections by an insulating layer arranged between the intersections (Figure 5 and Column 8, lines 42-64).

Peeters also teaches affinity sensor, wherein the occupation density of the specific binding patterns on the individual area is different and the individual affinity areas carry different specific binding patterns (Abstract and Figures 1-5).

Yamashita in view of Peeters do not teach a comb electrode structure, wherein the affinity areas are arranged on a common chip surface wherein the area is accessible to the complementarily associated binding partners provided in a sample medium.

Oyama et al. teach a comb electrode structure, wherein the affinity areas are arranged on a common chip surface wherein the area is accessible to the complementarily associated binding partners provided in a sample medium (Column 2, lines 26-32).

It would have been *prima facie* obvious to one having ordinary skill in the art at the time the invention was made to combine and substitute the comb electrode structure, wherein the

affinity areas are arranged on a common chip surface of Oyama et al., wherein the area is accessible to the complementarily associated binding partners provided in a sample medium. into the affinity sensor of Yamashita in view of Peeters, since Oyama et al. state, "J.C. Andle et al have reported the successful detection of DNA by the use of a sensor comprising a so-called SAW device having a comb electrode formed on the surface of a piezoelectric plate. In this report, the sensitivity of DNA detection is indicated to be 0.1 nanogram in mass sensitivity (Column 2, lines 26-31)." By employing scientific reasoning, an ordinary artisan would have combined and substituted the comb electrode structure, wherein the affinity areas are arranged on a common chip surface of Oyama et al. into the affinity sensor of Yamashita in view of Peeters in order to improve the analysis of biological molecules. An ordinary practitioner would have been motivated to combine and substitute the comb electrode structure, wherein the affinity areas are arranged on a common chip surface of Oyama et al. into the affinity sensor of Yamashita in view of Peeters in order to achieve the express advantages, as noted by Oyama et al., of an invention which provides a successful detection of DNA by the use of a sensor comprising a so-called SAW device having a comb electrode formed on the surface of a piezoelectric plate and in which the sensitivity of DNA detection is indicated to be 0.1 nanogram in mass sensitivity.

5. Claim 13 is rejected under 35 U.S.C. 103 (a) over Yamashita (U.S. Patent 5,646,420) (July 8, 1997) in view of Peeters (U.S. Patent 6,325,904 B1) (December 4, 2001) further in view of Oyama et al. (U.S. Patent 5,552,274) (September 3, 1996) further in view of Heller et al. (U.S. Patent 6,281,006 B1) (August 28, 2001).

Yamashita in view of Peeters further in view of Oyama et al. teach the affinity sensor of claims 1-12, and 14-24 as described above.

Yamashita in view of Peeters further in view of Oyama et al do not teach the affinity sensor wherein at least one reference area is provided which carries inactive binding partner for a reference measurement instead of the specific binding partners.

Heller et al teach the affinity sensor wherein at least one reference area is provided which carries inactive binding partner for a reference measurement instead of the specific binding partners (Column 5, lines 43-59).

It would have been *prima facie* obvious to one having ordinary skill in the art at the time the invention was made to combine and substitute the affinity sensor wherein at least one reference area is provided which carries inactive binding partner for a reference measurement instead of the specific binding partners of Heller et al. into the affinity sensor of Yamashita in view of Peeters further in view of Oyama et al since Heller et al. state, "Preferably the reference electrode is one that does not leach ions and maintains a constant potential (Column 5, lines 54-55)." By employing scientific reasoning, an ordinary artisan would have combined and substituted the affinity sensor wherein at least one reference area is provided which carries inactive binding partner for a reference measurement instead of the specific binding partners of Heller et al. into the affinity sensor of Yamashita in view of Peeters further in view of Oyama et al. in order to improve the analysis of biological molecules. An ordinary practitioner would have been motivated to combine and substitute the affinity sensor wherein at least one reference area is provided which

carries inactive binding partner for a reference measurement instead of the specific binding partners of Heller et al. into the affinity sensor of Yamashita in view of Peeters further in view of Oyama et al in order to achieve the express advantages, as noted by Heller et al., of reference electrode that does not leach ions and maintains a constant potential.

Response to Amendment

6. In response to amendment, all previous 103(a) rejections are hereby being properly maintained.

Response to Arguments

7. Applicant's arguments with respect to all pending claims have been considered but are not persuasive.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant also argues that there is no motivation to combine the references. This argument is not persuasive in view of the strong motivation provided by Oyama et al as Oyama et al. state, "J.C. Andle et al have reported the successful detection of DNA by the use of a sensor comprising a so-called SAW device having a comb electrode formed on the surface of a piezoelectric plate. In

this report, the sensitivity of DNA detection is indicated to be 0.1 nanogram in mass sensitivity (Column 2, lines 26-31)." This argument is applicable to all other references.

In response to applicant's argument that Yamashita is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Yamashita reference is definitely in the field of applicant's endeavor i.e., an affinity sensor with electrodes for detecting specific molecular binding events, wherein the immobilized specific binding partners covers the electrodes with a thickness which permits tunnel effects (Column 1, line 50 to Column 3, line 37 and claims 1 and 11). Therefore, the non-analogous art argument is not persuasive.

Applicant then argues the 103 rejection is improper because it is "obvious to try" and lacks a reasonable expectation of success.

With regard to the "obvious to try" argument, The MPEP 2143.02 states "Obviousness does not require absolute predictability, however, at least some degree of predictability is required. Evidence showing there was no reasonable expectation of success may support a conclusion of nonobviousness. In re Rinehart , 531 F.2d 1048, 189 USPQ 143 (CCPA 1976) (Claims directed to a method for the commercial scale production of polyesters in the presence of a solvent at superatmospheric pressure were rejected as obvious over a reference which taught the claimed method at atmospheric pressure in view of a reference which taught the

claimed process except for the presence of a solvent. The court reversed, finding there was no reasonable expectation that a process combining the prior art steps could be successfully scaled up in view of unchallenged evidence showing that the prior art processes individually could not be commercially scaled up successfully.). See also Amgen, Inc. v. Chugai Pharmaceutical Co ., 927 F.2d 1200, 18 USPQ2d 1016 (Fed. Cir.), cert. denied , 502 U.S. 856 (1991) (In the context of a biotechnology case, testimony supported the conclusion that the references did not show that there was a reasonable expectation of success. 18 USPQ2d at 1022, 1023.); In re O'Farrell , 853 F.2d 894, 7 USPQ2d 1673, 1681 (Fed. Cir. 1988) (The court held the claimed method would have been obvious over the prior art relied upon because one reference contained a detailed enabling methodology, a suggestion to modify the prior art to produce the claimed invention, and evidence suggesting the modification would be successful.)."

There is no evidence of record submitted by applicant demonstrating the absence of a reasonable expectation of success. There is evidence in the Oyama reference of the enabling methodology, the suggestion to modify the prior art, and evidence that sensitivity of DNA detection was actually experimentally studied and found to be functional at 0.1 nanogram mass sensitivity level (Column 2, lines 26-31).. This evidence of functionality trumps the attorney arguments, which argues that all references cited in the last rejection are invitation to research, since Oyama steps beyond research and shows the functional product.

In view of the response to argument, all 103(a) rejections are hereby being properly maintained.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arun Chakrabarti, Ph.D., whose telephone number is (703) 306-5818. The examiner can normally be reached on 7:00 AM-4:30 PM from Monday to Friday. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Benzion, can be reached on (703) 308-1119. The fax phone number for this Group is (703) 305-7401. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group analyst Chantae Dessau whose telephone number is (703) 605-1237.

Arun Kr. Chakrabarti

ARUN K. CHAKRABARTI
PATENT EXAMINER

Arun Chakrabarti,

Patent Examiner,

July 23, 2003